

RESPONSE

Claims 1-67 are now pending in the application. Claims 1-31 have been amended and claims 32-67 have been added. No new matter has been added.

The rejections from the Office Action of May 3, 2005 are discussed below. Reconsideration of the application is respectfully requested in light of the above amendments and the following remarks.

I. Claim Objections

Claim 18 was objected to for an informality. Claim 18 has been amended to delete the recitation of "PtMn-alloy" according to the Examiner's suggestion. It should be noted that new independent claims 33, 46 and 55 all have the recitation of "X-Mn alloy..." and have "PtMn-alloy" deleted. Likewise, in new dependent claim 32, "PtMn-alloy" is present, but the recitation of "X-Mn alloy" is deleted as in original claim 18.

II. 35 U.S.C. § 112 Rejections

Claim 3 was rejected as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 3 has been amended to depend from claim 1 rather than claim 2 to obviate the indefiniteness rejection.

III. Double Patenting Rejections

A. Rejection over U.S. Patent App. No. 10/671,970 ("Hasegawa '970") in view of JP 2000-348309 A ("Hasegawa '309")

Claims 1-31 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-16 of Hasegawa '970 in view of Hasegawa '309 (now U.S. Patent No. 6,700,756). This rejection is overcome by the filing of the enclosed terminal disclaimer of Hasegawa '970. Accordingly, this rejection has been overcome.

B. Rejection over U.S. Patent App. No. 10/823,484 (“Saito”) in view of Hasegawa ‘309 and JP 2000-163717 (“Kishi”)

Claims 1-31 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3, 17 and 26-38 of Saito in view of Hasegawa ‘309 and Kish. This rejection is improper as the Saito U.S. Application date (4/13/2004) is after that of the instant application (9/30/2003). Accordingly, this rejection is traversed.

C. Rejection over U.S. Patent App. No. 10/925,268 (“Hasegawa ‘268”) in view of Hasegawa ‘309 and Kishi

Claims 1-31 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-17 and 40-62 of Hasegawa ‘268 in view of Hasegawa ‘309 and Kish. This rejection is improper as the Hasewaga ‘268 U.S. Application date (8/24/2004) is after that of the instant application (9/30/2003). Accordingly, this rejection is traversed.

D. Rejection over U.S. Patent No. 6,608,740 (“Tanaka”) in view of Kishi

Claims 1, 3, 5-10, 13, 14 and 16 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 14 and 15 of Tanaka in view of Kishi. Tanaka discloses a composite of an antiferromagnetic layer, a pinned magnetic layer, a nonmagnetic conductive layer, and a free magnetic layer that also has bias layers and electrode layers on two sides thereof, where the hard bias layers magnetize the free magnetic layer in a direction perpendicular to the pinned magnetic layer. Tanaka fails to disclose a “pair of first antiferromagnetic layers [with] a predetermined space in the track width direction so that the pair of first antiferromagnetic layers is in contact with both side portions of the first magnetic layer in the thickness direction” as in Claim 1.

Kishi discloses an antiferromagnetic substance layer which consists of magneto-resistive effect film by which at least one-layer antiferromagnetic substance layer and a magnetic-shielding layer with said magneto-resistive effect film prepared up and down through the lead gap layer. Kishi, Claim 1. Kishi discloses only a structure in which an

antiferromagnetic layer has thick portions formed above or below both side portions of a pinned magnetic layer and a central thin layer portion. As shown in Figs. 1, 3, 5 and 6 of Kishi, the width of a free magnetic layer in the track width direction is larger than the space between a pair of the thick portions of the antiferromagnetic layer in the track width direction. Therefore, Kishi also fails to disclose a "pair of first antiferromagnetic layers [with] a predetermined space in the track width direction so that the pair of first antiferromagnetic layers is in contact with both side portions of the first magnetic layer in the thickness direction" as in independent Claim 1.

All the elements of independent claim 1 are not disclosed and therefore, all the elements of dependent claims 3, 5-10, 13, 14 and 16 are also not shown. Accordingly, this rejection of claims 1, 3, 5-10, 13, 14 and 16 has been overcome.

New independent claims 33, 46 and 55 are not subject to this rejection by their incorporation of the subject matter of claim 19, 26 and 29, respectively.

E. Rejection over Tanaka in view of Kishi and U.S. Patent No. 6,462,919 ("Mack")

Claims 2, 4, 11, 12 and 15 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 14 and 15 of Tanaka in view of Kishi and further in view of Mack. Tanaka and Kishi are described above as lacking all the elements of independent claim 1 and therefore lacking all the elements of dependent claims 2, 4, 11, 12 and 15. Mack also fails to disclose a "pair of first antiferromagnetic layers [with] a predetermined space in the track width direction so that the pair of first antiferromagnetic layers is in contact with both side portions of the first magnetic layer in the thickness direction" as in independent Claim 1. Accordingly, Applicants this rejection of claims 2, 4, 11, 12 and 15 has been overcome.

As above, new independent claims 33, 46 and 55 are not subject to this rejection.

IV. § 103(a) Rejections

A. § 103(a) Rejection over Tanaka in view of Kishi

Claims 1, 5-10, 13, 14 and 16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanaka in view of Kishi. This rejection is overcome in view of the

amendment of independent claim 1. Tanaka and Kishi were described above as failing to disclose all the elements of independent claim 1.

Tanaka discloses a composite of an antiferromagnetic layer, a pinned magnetic layer, a nonmagnetic conductive layer, and a free magnetic layer that also has bias layers and electrode layers on two sides thereof, where the hard bias layers magnetize the free magnetic layer in a direction perpendicular to the pinned magnetic layer.

Tanaka, Abstract. Tanaka fails to disclose a "pair of first antiferromagnetic layers [with] a predetermined space in the track width direction so that the pair of first antiferromagnetic layers is in contact with both side portions of the first magnetic layer in the thickness direction" as in Claim 1.

Kishi discloses an antiferromagnetic substance layer which consists of magneto-resistive effect film by which at least one-layer antiferromagnetic substance layer and a magnetic-shielding layer with said magneto-resistive effect film prepared up and down through the lead gap layer. Kishi, Claim 1. Kishi discloses only a structure in which an antiferromagnetic layer has thick portions formed above or below both side portions of a pinned magnetic layer and a central thin layer portion. As shown in Figs. 1, 3, 5 and 6 of Kishi, the width of a free magnetic layer in the track width direction is larger than the space between a pair of the thick portions of the antiferromagnetic layer in the track width direction. As described in lines 17 to 25 on page 13 of the specification of this application, both side regions of the free magnetic layer, which are disposed on both sides of the thin layer portion of the antiferromagnetic layer, have the problem of degrading resolution due to the large space between upper and lower shield layers and producing noise.

The combination of Kishi with Tanaka fails to disclose or suggest the relation between the space between the pair of magnetization control layers, which faces the free magnetic layer, and the space between the pair of antiferromagnetic layers, which faces the pinned magnetic layer. The combination also fails to disclose or suggest that "a minimum dimension of the space between the pair of magnetization control layers is the same as or smaller than a minimum dimension of the predetermined space in the track width direction of the pair of first antiferromagnetic layers" as in claim 1. See Description p.48, l.15 – p.49, l.15; and Summary p.13 ll.17-25.

Likewise, the reason for this rejection is believed to be overcome in new independent claims 33, 46 and 55. New independent claim 33 is not subject to this rejection by its incorporation of the subject matter of claim 19, which is not rejected under 35 U.S.C. § 103(a). New independent claim 46 is not subject to this rejection by its incorporation of the subject matter of claim 26, which is not rejected under 35 U.S.C. § 103(a). New independent claim 55 is not subject to this rejection by its incorporation of the subject matter of claim 29, which is not rejected under 35 U.S.C. § 103(a).

Accordingly, Applicant believes the independent claims 1, 33, 46 and 55 are in condition for allowance and the dependent claims corresponding to those independent claims are also in condition for allowance.

B. § 103(a) Rejection over Tanaka in view of Kishi and Hasegawa '309

Claims 2-4, 11, 12 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanaka in view of Kishi and further in view of Hasegawa '309. This rejection is overcome in view of the amendment of independent claim 1 together with the following remarks. Tanaka and Kishi were described above as failing to disclose all the elements of independent claim 1. Hasegawa '309 fails to disclose the elements that are not disclosed or suggested in either Tanaka or Kishi. Hasegawa '309 fails to disclose or suggest the relation between the space between the pair of magnetization control layers, which faces the free magnetic layer, and the space between the pair of antiferromagnetic layers, which faces the pinned magnetic layer. The combination also fails to disclose or suggest that "a minimum dimension of the space between the pair of magnetization control layers is the same as or smaller than a minimum dimension of the predetermined space in the track width direction of the pair of first antiferromagnetic layers" as in claim 1. See Description p.48, l.15 – p.49, l.15; and Summary p.13 ll.17-25. Because claims 2-4, 11, 12 and 15 all depend from claim 1, Applicants this rejection of claims 2-4, 11, 12 and 15 has been overcome.

New independent claims 33, 46 and 55 are not subject to this rejection for the reasons discussed above.

C. § 103(a) Rejection over Tanaka in view of Kishi and U.S. Patent No. 5,949,623 (“Lin”)

Claims 17, 18, 20, 21 and 31 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanaka in view of Kishi and further in view of Lin. This rejection is overcome in view of the amendment of independent claim 1 together with the following remarks. Tanaka and Kishi were described above as failing to disclose all the elements of independent claim 1. Lin also fails to disclose the elements that are not disclosed or suggested in either Tanaka or Kishi. Lin fails to disclose or suggest the relation between the space between the pair of magnetization control layers, which faces the free magnetic layer, and the space between the pair of antiferromagnetic layers, which faces the pinned magnetic layer. The combination also fails to disclose or suggest that “a minimum dimension of the space between the pair of magnetization control layers is the same as or smaller than a minimum dimension of the predetermined space in the track width direction of the pair of first antiferromagnetic layers” as in claim 1. See Description p.48, l.15 – p.49, l.15; and Summary p.13 ll.17-25. Because claims 17, 18, 20, 21 and 31 all depend from claim 1, Applicants this rejection of claims 17, 18, 20, 21 and 31 has been overcome.

New independent claims 33, 46 and 55 are not subject to this rejection for the reasons discussed above.

D. § 103(a) Rejection over Tanaka in view of Kishi, Lin, U.S. Patent App. No. 2003/0179516 (“Freitag”), and U.S. Patent App. No. 2005/00424796 (“Tanahashi”)

Claims 22-25 and 30 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanaka in view of Kishi and Lin, and further in view of Freitag and Tanahashi. This rejection is overcome in view of the amendment of independent claim 1 together with the following remarks. Tanaka, Kishi and Lin were described above as failing to disclose all the elements of independent claim 1. Freitag and Tanahashi also fail to disclose the elements that are not disclosed or suggested in Tanaka, Kishi or Lin. Freitag and Tanahashi fail to disclose or suggest the relation between the space between the pair of magnetization control layers, which faces the free magnetic layer,

and the space between the pair of antiferromagnetic layers, which faces the pinned magnetic layer. The combination also fails to disclose or suggest that "a minimum dimension of the space between the pair of magnetization control layers is the same as or smaller than a minimum dimension of the predetermined space in the track width direction of the pair of first antiferromagnetic layers" as in claim 1. See Description p.48, l.15 – p.49, l.15; and Summary p.13 ll.17-25. As claims 22-25 and 30 all depend from claim 1, Applicants this rejection of claims 22-25 and 30 has been overcome.

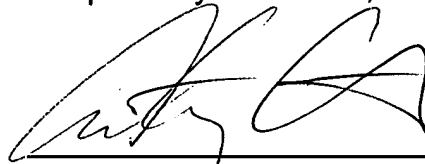
New independent claims 33, 46 and 55 are not subject to this rejection for the reasons discussed above.

V. Conclusion

The rejections in the Office Action dated May 3, 2005 have been addressed and no new matter has been added. Applicants submit that all of the pending claims are in condition for allowance and notice to this effect is respectfully requested. The Examiner is invited to call the undersigned if it would expedite the prosecution of this application.

August 2, 2005
Date

Respectfully submitted,



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